

Windows and Doors

ARCHITECTURAL DESIGN GUIDELINES FOR THE H-2 DISTRICT

22

CITY OF ROANOKE



The windows and entry door present on this façade give the building much of its architectural identity.

Windows and doors are especially important in rehabilitations. Their size, shape, pattern, and architectural style not only provide architectural character but give a building much of its scale, rhythm, and detail.

IMPORTANT CONSIDERATIONS...

Windows and doors are important in providing interest and detail to a building's appearance.

Periodic maintenance is necessary to prevent deterioration and maintain thermal efficiency.

Storm windows, doors, and other energy conservation efforts need not detract from a building's appearance.

GUIDELINES FOR PRESERVATION AND REHABILITATION

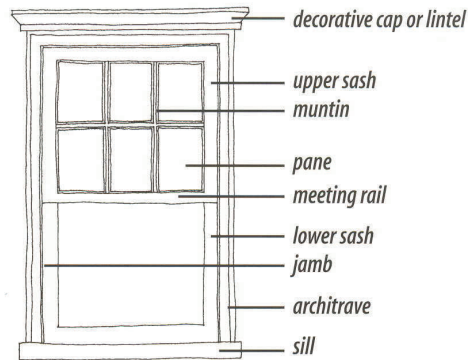
- Recommended actions or treatments are indicated by ✓.
- Actions or treatments not recommended are indicated by X.

Retaining Existing Windows and Doors

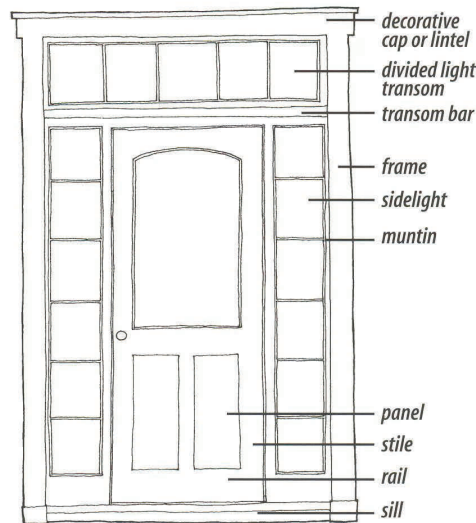
✓ Identify and keep the original materials and features of windows and doors. Important characteristics include:

- size,
- fanlights,
- shape,
- sidelights,
- glazing,

- hardware,
- muntins,
- shutters, and moldings.



Shown are characteristic features of a double-hung window.



Shown are characteristic features of an entry door.

✓ Retain specialty windows such as:

- stained glass,
- etched glass,
- leaded glass,
- colored glass, and
- other specialty glass.

✓ Seek expert professional advice on preservation, rehabilitation, and repair of all windows.

X Do not enlarge or fill in windows or doors on any prominent side of a building.

DEFINITIONS

Architrave: An ornamental molding used around doors and windows.

Cross bucks: Decorative cross braces.

Fanlight: A semi-circular window over the opening of a door, with radiating muntins in the form of a fan.

Glazing: Pieces of glass making up a window.

Jamb: The vertical framing at either side of a door or window.

Lintel: A horizontal beam over an opening which carries the weight of the structure above.

Meeting rail: In a double-hung window, the horizontal member at the top of the lower sash or the bottom of the upper sash.

Moldings: Decorative trim.

Mullion: Vertical member separating (and often supporting) windows, doors, or panels.

Muntins: Framing members that hold panes of glass within a window.

Pane: A flat sheet of glass used for glazing a window.

Sash: The framework of a window that holds the panes of glass that may slide vertically or pivot.

Sidelight: A framed area of glass alongside a door or window opening.

Stile: A vertical, structural component of a door or window.

Transom: A fixed or operable sash above a door or window.

Transom bar: The framing member that separates the door opening from the transom window.

✗ Do not remove historic wood or steel windows that are still in good overall conditions.

Replacing Existing Windows

✓ Repair original windows by patching, splicing, consolidating, or otherwise reinforcing. *Wood that appears to be in bad condition because of peeling paint or separated joints can often be repaired.*



Shown is a window that has been fully repaired With new ropes and weights to make it operable.

✓ If a limited area or numbers of windows are damaged or deteriorated, repair with compatible materials is recommended rather than the removal and replacement of the window. Replace entire windows only when they are missing or beyond repair.

✓ If owners choose to remove and replace their historic windows they must first present sufficient physical and photographic evidence and information to the ARB regarding the condition of the existing windows and the feasibility of repair, replacement in kind, and replacement with new materials. Replacement should be based upon physical evidence and photo documentation rather than the availability of stock or replacement windows.

✓ If historic windows need to be replaced, consider only the replacement of the sash units themselves and not the entire window frame or surround.

✓ If replacement is warranted based upon severe deterioration of sashes or framing, window sash and glazing sizes may not be reduced more than 10% from the original sash and glazing size. Proper documentation of the proposed reduction in size (square inches) is required.

Calculation

1. Determine existing glass size per sash (sq. in)

$$\text{new glass width (in.)} \times \text{new glass height (in.)} = 'A' \text{ Exist}$$
2. Determine new glass size per sash to existing glass size per sash

$$(0.95) \text{ existing glass width (in.)} \times \text{new glass height (in.)} = 'A' \text{ New}$$
3. New glass size per sash cannot be less than 10% of the existing glass size per sash

$$\text{Compare } 'A' \text{ Exist} \times 0.9 = \text{or} < 'A' \text{ New}$$

Example:

1. Existing glass width x Existing glass height = sq. in. (per sash)

$$26 \times 30 = 780$$
2. New glass width x new glass height = sq. in (per sash)

$$25 \times 29 = 725$$
3. Existing sq. inch x 0.9 = sq. inches

$$780 \times 0.9 = 702 \text{ sq. inches}$$
4. 702 sq. inches is within 10% of original sash measurements



Shown is an appropriate new wood window which matches the original.

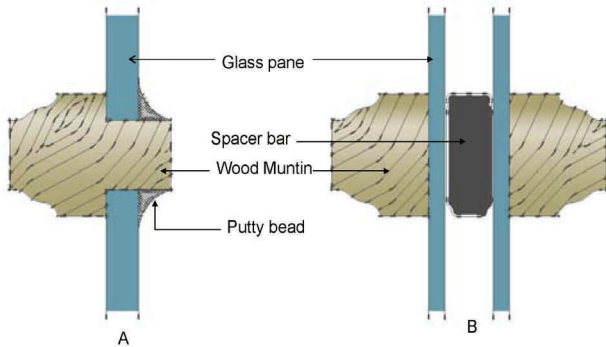
DEFINITIONS

Caulking: A rubber-like compound used to seal cracks and joints and provide waterproofing.

Flashing: Pieces of sheet metal or flexible membrane used to protect joints from water penetration.

Weather-stripping: A strip of synthetic rubber applied to exterior door and windows to halt air and water penetration.

X Do not use inappropriate materials or finishes that radically change the sash or glazing size, depth of reveal, muntin configuration, reflective quality or color of the glazing, or appearance of the frame. Appearance of the finished window is the paramount concern. Steel, vinyl or fiberglass seldom match the appearance of wood, and they do not lend themselves to the application of added detailing.



Detail A above illustrates (in cross section) the ideal method of muntin replacement for an historic window. A wood muntin of identical size and profile to the original divides the individual panes. Glazing putty is used to seal the pane to the muntin, taking care to avoid forming a putty bead that is wider than the lip of the muntin.

Detail B shows a method for simulating the look of individual panes of glass in a multi-pane window. A decorative bar is applied to both the inside and outside face of the glass, and a spacer bar is placed in between the glass. This is most commonly referred to as “simulated divided lite”. Although there are other methods, those illustrated below are the generally acceptable ones.

✓ If replacement is warranted, use replacement windows with true divided lites or interior and exterior fixed muntins with internal spacers (known as simulated divided lites,) to replace historic or original windows.

✓ False muntins and internal removable grilles do not present a historic appearance and are not appropriate.



New windows should be consistent with historic windows in their size, configuration, and profile.

Maintenance

✓ Protect wood windows and doors from water damage by:

- repairing leaky window-unit air conditioners,
- replacing cracked or loose glazing putty, and
- repairing deteriorated caulking and flashing.

✓ Protect metal windows and doors from deterioration by:

- keeping steel windows and doors painted and
- keeping different metals free from contact with each other.

✓ Make windows weather tight by replacing deteriorated weatherstripping.

✓ Reuse existing windows and doors after repairing frames and jambs.

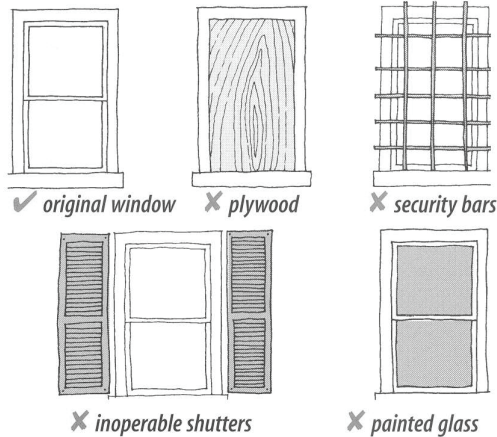
✓ Protect windows and doors from water damage by ensuring that their sills slope away from the building and provide water run off.

X Replace windows to improve thermal efficiency only as a last resort; match existing windows if replacement occurs.

Replacing Missing Windows and Doors

✓ Replace missing doors and windows with new ones that duplicate the originals in:

- size and shape,
- profile and dimensions, sash,
- pane, or panel configuration, and
- materials and color.



Inappropriate window treatments such as the ones shown should be removed.



Oval windows such as the one shown on the left were popular in Victorian house styles like Queen Anne, Shingle, and Second Empire. Windows like that on the right, with multiple, vertical upper lights and a single lower light were favored for Bungalow, American Four-square, and Arts and Crafts houses.

Removing Inappropriate Treatments

✓ The historic transparency of window glass should be maintained. Remove the following inappropriate window or door treatments:

- sheet metal or plywood that cover openings,

- masonry or other infill materials that enclose original openings,
- security bars, grates, or grilles,
- inauthentic or inoperable shutters attached directly to the exterior wall, and paint applied to the interior or exterior surface of glass.

Repairing Damage

✓ Recaulk joints and repair loose glazing putty where water enters at window or door frames.

✓ Repair deteriorated wood by patching, splicing, consolidating, or reinforcing.

✓ Repair loose, cracked, or missing window panes.

✗ Do not replace an entire window that needs only limited repair.

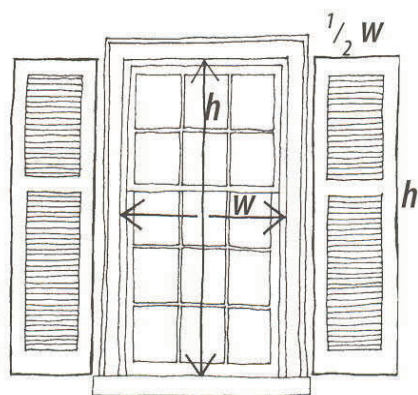
✓ Choose an inconspicuous location, such as the rear or least visible side of a building, when a change of building use requires the conversion of a window to a door or the addition of a new window or door.



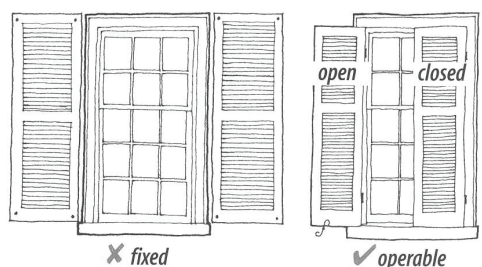
X Avoid eliminating windows or doors from any prominent side of a building.
X Do not use replacement windows and doors that are not characteristic of a house's style or create a false historic appearance.

Shutters

✓ Each shutter should be equal to the height of the window opening, but one half its width.



Shown are properly sized shutters.



The shutters on the left are inappropriate because of their fixed nature. Those on the right are appropriate because they are operable, properly sized, and hung to shed water.

Doors

✓ Consider new replacement doors only when old replacements are unavailable. New replacements should be compatible in:

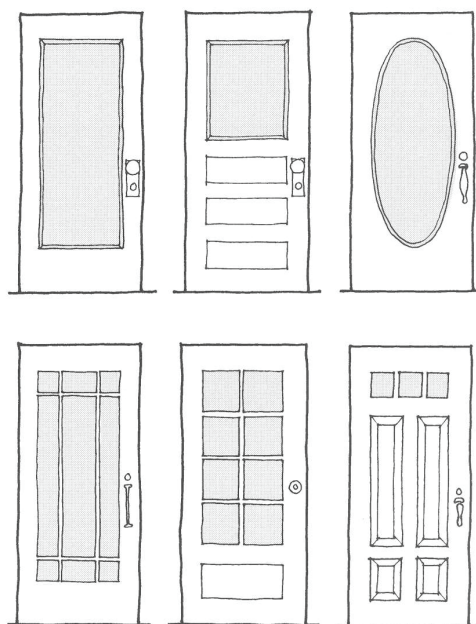
- size and shape,
- proportion, and
- Design materials.

✓ Appropriate design for glass in front doors is clear beveled or flat glass. Decorative or stained glass is not always appropriate.



Single-light paneled wood doors such as these were commonly used on most district styles. They are most appropriate for use on Queen Anne, Shingle, Arts and Crafts, American Four-square, bungalow, and Second Empire houses.

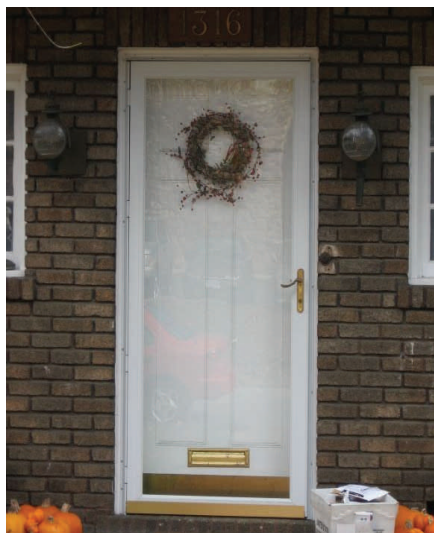
X Metal paneled doors are appropriate only on rear or side elevations and must include an appropriate design and glass area for the architectural style of the building.



A variety of door styles can be found in the H-2 District. When selecting a replacement door, choose a traditional design that is compatible with the style of your building. To learn more about compatible doors for your house, you may wish to consult a visual dictionary of historic architecture or historic photographs of houses with the same style or form as yours.



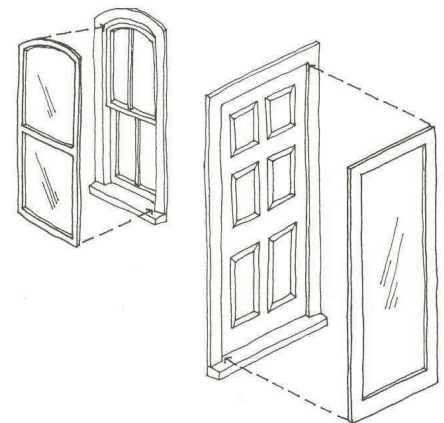
Multi-light doors were popular choices for Arts and Crafts and Bungalow designs.



These appropriate storm windows are painted to match the window surrounds and are a one-over-one design. The storm door is appropriately transparent.

Energy Efficiency/Storm Windows and Doors

- ✓ Install appropriate weather stripping, such as rolled vinyl strips, to reduce air infiltration.
- ✓ Use storm windows and doors to improve the thermal efficiency of existing windows and doors as long as:
 - they are made of wood or metal and are painted to match the sash,
 - they are set into the existing window or door opening rather than attached to the frame,
 - storm windows repeat the pattern of principal muntins and meeting rails, and storm doors are primarily glass, revealing as much of the original door as possible.
- ✓ Do not decrease the size of openings or use reflective glass to achieve energy efficiency.
- ✗ Do not use window air conditioners on the primary facade of a residence. If necessary, locate window units in openings on less prominent sides of a building.



Shown is proper design and installation of storm windows and doors.

Energy Efficiency

A building functions as a system, therefore a holistic approach should be taken when evaluating its energy consumption and efficiency. Factors to consider must include the building's condition, history of energy consumption, and its use.

Insulation – Adding insulation is most effective first in the attic, then the exterior of the foundation, then walls, and finally the floor (if at all). Eighty percent of heat loss in buildings is through the vertical spaces (ceilings, roofs, and walls). For older and historic buildings, the effect of disrupting historic materials must be weighed against the effect of adding insulation. Adding insulation to solid masonry walls or wood-sided buildings may impact the durability of the material because the material outside of the insulation will be subjected to greater stress of low temperatures, higher moisture, and longer drying periods. For painted wood frame or sided buildings the result is almost immediate paint failure.*

Windows – Not only are historic windows important character-defining features of historic buildings, window replacement in most cases is **not** cost effective. The use of caulking, weather stripping and exterior storm windows is recommended. Older windows can last for 100 years or more if maintained attentively. Modern windows are unlikely to hold up that long.

'Maintenance Free' Replacement Windows

Many replacement windows, in reality, cannot be maintained well or conserved. Vinyl, fiberglass, sealants, desiccants, and coating systems all degrade, and they are materials that remain difficult or impossible to recycle or conserve.

While manufacturers' warranties have been lengthened in the past few years (they are now generally from 2 to 10 years), they still pale in comparison to the actual perform-

ance life exhibited in historic windows, which can reach 60 to 100 years and more, often with just minimal maintenance.

The total effective percentage of heat loss attributed to the window units themselves is only approximately 12.5 percent. That is a relatively small percentage for a potentially large investment, especially when other options are available. In actuality, typical window-replacement systems offer payback periods that are often nowhere near manufacturers' claims: the payback of a typical unit could take as long as 100 years.**

*Adapted from: Preservation Brief #3, *Improving the Energy Efficiency of Historic Buildings*.

**Adapted from: *What Replacement Windows Can't Replace: The Real Cost of Removing Historic Windows* by Walter Sedovic and Jill H. Gotthelf, *How to Save Money on Home Energy* by Zolton Cohen and "Creating Windows of Energy-Saving Opportunity," *Home Energy* 14, no. 5 (1997) by Andrew M. Shapiro and Brad James.